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A Dynamic Area-Pressure Model Applied to Crystals in A Pot Plant Battery and Other Space Matter

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ABSTRACT

Physical space, geometry, and matter are described with a theoretical formula, based on experimental results for a certain battery device. The model is derived from mechanical pressure on an area and applied for forming crystals. Those were found to develop in electrical devices, providing a spatial equivalent to the electrolyte. This study provides an explanatory model in some crystal formations as well as the optical reflections in terms of spectral activity.

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1. INTRODUCTION

Mathematics with its spaces was more often generated to describe physics and in the present paper, among other aspects, we consider a weak formulation of an equation. So-called weak formulations are found to establish and formulate the finite element method (FEM) from equations for motion, followed by Galerkin's method, and other generalizations (Tornabene *et al*., 2015; Cremonesi *et al*., 2020). Here, a re-formulation allows events that do not happen simultaneously to be subdivided into 3 dimensions and then gathered in sub-spaces. A weak formulation, as in FEM, would be multiplication with a weighting function and time averaging (Liu, 2010). That provides exact solutions depending on time constants, but this is not evaluated in the present paper.

Furthermore, we utilized differential geometry, in its nomenclature, and to capture certain shapes. The co-existence of motions in arcs and birth into Cartesian shapes is readily caught in a formula and analyzed in specific correlations. In space, the swept area in an elliptic orbit is assumed to generate area fragments and pressure on a smaller scale. An introductory section describing the matter of crystals is also considered in the modeling. Then, the model with mechanical pressure and area is deduced. This is solved for several applications related to physics. Connecting to beauty for the forming crystals, the shapes of flowers and leaves are addressed.

2. METHODS

The present paper provides results for crystal growth on an electrode and in the electrolyte of a Pot Plant Battery. It was found that after the crystals appeared, the battery worked dry without the initial electrolyte (such as water and salt). Other results and theoretical models are gathered and together with additional prospects.

3. RESULTS AND DISCUSSION

The model was applied to load in a capacitor and piezo electricity (**Figure 1)**. After 2 years of aging, the appearance in **Figure 1** was found to develop crystals at the battery levels (**Figure 2**). Different crystals were found, found when using copper (Cu) (**Figure 2a**) and iron (Fe) (**Figure 2b**) (observed in behind the clip in this view). The formation of crystal behind the iron was also found at the rear, specifically in the foil capacitor in the circuit. At the front, a button cell- Li-battery and an LED light with attachment to the battery and the foil.

Figure 1. Pot made in plastic, with soil, bog moss, and two electrodes.

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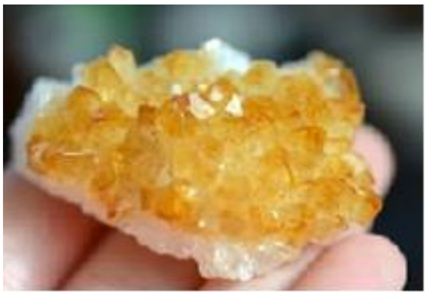
(a) (b)

Figure 2. Photograph images for the appearance of crystal: (a)'White yellow'-Crystals on the Fe-electrode. The green oxide is on the Cupper line attached to the electrode. (b) Bog moss with white crystals in the pot. It is also observed behind the Fe-electrode (shown in Figure (a).

Figure 3 shows the appearance of the crystal formed. There are some impurities in the sample. The white crystal is formed in the system. This is probably from salt crystals (composed by Na atoms). Originally, water and NaCl are used as battery fuel in a soil electrolyte. Then, when it is dried, they form white crystal. Other impurities are due to some oxides connected to Iron. Also, it could also be due to a carbon equivalent that was added to obtain a mild steel with the Ferrous material. The green color in the copper is due to the characteristics of low aging and the condition when no galvanic stress.



(a)

(b)

Figure 3. Yellow crystal formation. Figure (b) is a magnified image of Figure (a).

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Steel is characterized by its micro-structure, which at a certain scale and composition can consist of crystal lattices, such as face centered cubic (FCC). Since electricity is present at a minor scale and has the tendency to develop in conjunction with other processes (such as chemical reactions and material degradation), it is possible that the crystal now indicates the path. It is instead of the water in the soil as before and when not dry and no crystal formation. A description invokes a framework of chemical electro-dynamics (Rollin *et al*., 2023) or related approaches. An atomistic quantum framework is used to derive oscillator strengths in terms of transition energy between states in Li, Na, and Ka (Ellis & Goscinski, 1974). The assumption is also motivated by how electricity transports in high power grids: it may use points making extra paths at a ground connection.

In piezo electricity, there is a standard for modeling with the coupling between elasticity and electricity variables (de Bem *et al*., 2022). Pressure could be omnipresent providing a link between different energies. It also connects with matter since acting on an area. As a model here, we consider an equation derived from the time differentiation of an area measure, denoted as A. For that purpose, a generalized pressure (p) is defined by equation (1)

$$p=F/A \tag{1}$$

where F is the force that varies more slowly than other factors. The area is assumed both as an individual geometric object and the space where contact with F. Hereby, we can model both pressure and areas that grown or vanished by crystals. The latter could be due to that they move away from the force or disappear. This is motivated when F has a constant input on a deforming body. Twice time differentiation of F/A assuming F constant gives equation (2):

$$p_t=(2(A_t/A)^2-A_t/A)p \tag{2}$$

where t is the time of differentiation, attached in pressure and area. Then, it is applied in an application for drying in a pressurized moving airflow.

After this initial application in engineering, we proceed with weak formulations from equation (2) and relate them to other physical phenomena and processes:

(i) Crystal growth
(ii) Oscillation of a crystal
(iii) Calculation of terms when A is the swept area at Kepler's planetary motion
(iv) Evaluation with the measure from Tti in a noncircular orbit.

For the generalised format and physical analogies, equation (2) is rewritten such that the left side is the linear ratios, as shown in equation (3)

$$p_t/p+A_t/A=2(A_t/A)^2 \tag{3}$$

For crystal growth and oscillation, we trace solutions assuming that areas at the left side of equation (3) develop from another dimension or a higher (or more rigid) level space. For the right side in equation (3), we consider a square or rectangular piece moving rigidly. For example, the scenario could be realized in equation (4):

Then,

$$A,_t= d_t(r^2)=2rv \tag{4}$$

Using the framework in differential geometry, we may choose that the left side functions in equation (3) are on a two-dimensional manifold (with bundles of coordinates).

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Next, we postulate that the term on the right side is a sum of two parts: One part with exact expressions connected to the left side and that in equation (4) (another space). Within differential geometry, if space is limited, it may be constrained to the co-tangent bundle. However, in reality, adjacent points could constitute additional dimensions.

In the left part in equation (4), for each of the pressure ratio and area ratios, solutions are postulated as harmonic oscillations, transients, exponentials, or cosinus hyperbolic. Then, an exact evaluation gives constant ratios.

Theorem 1: The perpendicular part is constant at rigid body rotation, and reads $8w^2$, where w is the angular velocity.

Proof. At rigid body motion v=wr. Insertion of (3) on the right side of (2), gives the result since $A,_t/A= 2w$.

Proposal. A generalized (weak) format is assumed spatial such that although the left side is nonzero and constant for general areas, by itself, the term at right *only* gives a contribution proportional to the exact result in Theorem 1. The terms at left may compose additively achieving also negative values. The negative part gives harmonic oscillations.

An application is the growth of a crystal plane at oscillating pressure. The solution of oscillating areas while increasing pressure agrees with the hardness developed.

Remarks. Projections of phase spaces are found in nonlinear dynamics, but the dimensions are often connected in other spaces. Here, as it appears, spatially, the axial vector for the angular velocity may be in the same dimensions as an area or pressure on the left side.

Another example is the growth of leaves on a tree (possibly why many species do not survive indoors).

Also, exact solutions with a singularity on the right side for oscillations, exponentials, and hyperbolics, can be traced in physics. The periodicity in a clockwork is accomplished by a Dirac pulse when the shear spring attached to the Oro wheel snaps.

For rotational space and Kepler motion, the Kepler motion is defined by a constant swept area. Assuming this for A(t) in equation (3), we can get equation (5):

$$p_t/p = 2(c/A)^2 \tag{5}$$

where c is the constant. When considering equation (5) as a differential equation for pressure and linearizing into A(t) constant, solutions are given by transients, exponentials, and hyperbolics.

Atmospheric activity into winds and materializations

Preliminaries: In the new version of Kepler motion, density, and gravity are included. The swept area condition is the time-invariant of a moment of momentum. Therefore, another generalization of equation (2) is evaluated. In this, the ratio at left is assumed to contribute as input, as well as being generated. The decomposition is given by a factor a, $0<a<1$.

Conjecture on materialization. For that certain central (generalized Kepler) motion, equation (2) reads

$$p,_{tt}/p+aA,_{tt}/A=(a-1)\,(2\, r,_{tt}/r + h,_{tt}/h + 4\, h,_t\, r,_t/hr) \quad +2(r,_t/r + h,_t/h)^2 \;\ldots\ldots\ldots \tag{5}$$

where r is the radius vector and h are the angle in the orbit.

We may identify a tidal part, a rotational part, a bilinear term, and nonlinear terms. For example, keeping only the linear terms as input on the right side, we have the tide analogy and the more dynamic angular acceleration, where both represent energies. These are assumed to generate and interact with small oscillating areas, such as leaves or flowers at a pressurized state, given by the left side.

For electromagnetic, loads are considered as areas. This appears as thunder rays and links to piezo electricity (de Bem *et al*., 2022) via the force and/or load density. Also, a strain gauge has that spatial dependency, and for beams of wavelike rays, the interaction in layers is distributed accordingly (Chafin, 2016).

When time in a space close to noncircular orbits, we consider Tti for a noncircular orbit. It is where an area is given from the deviation of a circle and represented by trigonometric functions, such as cosine. Then, from the notations, A= $r_e^2\sin(fwt)$ where f is the factor. The constant can be represented as 2 for tides, non-integer for the Mercury orbit, and 3/2 is connected to acoustics, and the Mercury spin. Next, w is the orbital angular velocity of the planet and r_e is generalized eccentricity. An exact evaluation and insertion in equation (2) provides an ordinary differential equation for pressure p(t) reading $p_{,tt}$ /p $=2(fw)^2(1+3\cot^2(fwt))$.

Remark. To obtain the creation of new areas and oscillating solutions, a factor may be introduced in the same manner as when deducing equation (5). Then, a linearization at fwt=p/2 gives $p_t/p=2(fw)^2$. When the spin-orbit ratio is 3/2, considered an astronomical fact, it presents in a 'Belles lettres-collection' of Monroe about moons. It emphasizes the in-between behavior of Mercury since being not only a planet but also a satellite to the Sun.

Finally, the modeling of areas and pressure with equation (2) is also used in literature. It is further elaborated and applied to crystals, electromagnetic, and other space matter.

The model is highlighted as:

(i) In equation (2), geometric area measures, A(t) were utilized to extract behavior with pressure and dynamics.
(ii) We considered generalizations of equation (2), with the left side assumed on the same level and where the right side could be perpendicular, emanating from a tangent bundle or a super space.
(iii) Features of white crystals on stems were modeled with areas, kinematics, and pressure.
(iv) The format in Tti provides a function for a quadratic area with the deviation from a circle in a noncircular orbit as the side.

For the discussion, we can consider several points:

(i) *EM-paths in the* Pot Plant Battery*.* Concerning the yellow crystals, **Figures 2 and 3** show color scenario, provided by assumptions for electromagnetism. The spectrum is shifted since blue is absorbed in magnetic polarisation. Then, interior reflections give a green color close to that on Cupper, thus leading the current. An angular shift can be derived from the format in equation (5) by a Taylor expansion of 1/h. Another guess is that electromagnetic condition remembers the location while jumping in the air, between the crystals. The theory for crystal electricity is given in (Cady, 1949). For reflection and transmission of a beam equivalent, the extension perpendicular into areas is visualized at interactions in layers and media.
(ii) The connection between an oscillation and pressure is seen for organic colors, e.g. blood vessels. From an exterior perspective, they send out a 'vibrating color' that looks blue-indigo. A scientist celebrated for interpreting the works of Laplace, a blue-violet was the crystal color connected to magnetism. The rainbow displays different colors related to the size of the area occupied.
(iii) The power in area interactions is present in river flows. The theory behind equation (2) gives a format motivated when the support for normal stress is not determined from

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classical linear theories (Lopes *et al*., 2023). An issue also present in the discretization of space in FEM (Colomés *et al*., 2023).

(iv) In general, knowledge about crystal growth near a Li-battery and copper is important to predict the impact on the environment.

A prospect is to obtain heat from a larger battery, such as to replace the LED-diode or lamp. It is also when facing a material that radiates heat. There are wires to put in gloves that work directly. However, the energy consumption is relatively large. It lasts some hours with 4.5 V from 3 AA batteries. To obtain a long-lasting thermal device, additional tasks are probably required. It is known that transformers of voltage have heat losses, and an inductive contact might be suitable, and it is not to shortcut at once. Other possibilities are loose contacts and attachment to a surrounding that oscillates, such as flowing water to the system.

4. CONCLUSION

The present paper provides results for crystal growth on an electrode and in the electrolyte of a Pot Plant Battery. It was found that after the crystals appeared, the battery worked dry without the initial electrolyte (such as water and salt). Other results and theoretical models are gathered and together with additional prospects.

5. ACKNOWLEDGMENT

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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